Section 816. TURF ESTABLISHMENT

816.01 Description. Turf establishment consists of furnishing and placing topsoil and/or compost, fertilizer, seed, sod, mulch, turf mulch blankets, mulch anchor, net for mulch, water, and weed control. Turf establishment shall be done within state and federal guidelines including, but not limited to, the MDOT Soil Erosion and Sedimentation Control Plan and the National Pollution Discharge Elimination System (NPDES).

Mulch Anchor. Mulch anchor is a glue type material that is sprayed over mulch to hold it in place. Tackifiers, mulch tackifier, adhesives, mulch adhesive, binders and mulch binder are all terms that are sometimes used to refer to mulch anchor pay item materials.

Broadleaf Weed. Those weeds described by the Engineer that are to be the target weeds controlled by spraying. Examples of broadleaf weeds include, but are not limited to the following: dandelion, dock, clovers, bindweed, thistles, ragweed, lambs quarter and wild carrot.

Compost. A mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings, leaves and brush materials under 4 inches in diameter.

Dormant Seeding. Dormant Seeding is seeding done in late November and December when plant growth has ended for the season. The seed is placed on unfrozen ground and mulched to lie dormant over winter and germinate the following spring.

Friable. Friable soil is easily crumbled or pulverized.

Friable Condition. A soil in a friable condition is defined as a surface which is in a crumbled, pulverized, worked-up, loosened, or cultivated state; free of lumps and clods detrimental to seeding and sodding operations.

Humus. A brown or black material formed by the decomposition of vegetable or animal matter, the organic portion of soil essential to the fertility of the earth.

Hydroseeding. Hydroseeding is the process of spraying seed that has been combined with water onto the prepared seed bed. The spray solution shall be free of mulch.

Mulch. Mulch is a material placed over seeding to facilitate the germination of seed by conserving moisture, moderating the soil temperature, and protecting the seed and soil from water and wind erosion.

Peat. Organic matter consisting of undecomposed or slightly decomposed plant material accumulated under conditions of excessive moisture. If the organic remains are sufficiently fresh to identify plant form, it is considered peat; if decomposition has gone so far as to make recognition of the plant form impossible, it is muck.

Target Weed. Target weeds are weeds that have been identified by the Engineer as those weeds which will be removed either by the spray method or other removal methods.

816.02 Materials. Materials shall meet the following requirements.

816.03 Construction.

A. **Topsoiling.** Topsoiling consists of preparing the foundation, furnishing, placing, and spreading humus bearing topsoil and/or compost. Topsoil may come from within the grading limits or from sources furnished by the Contractor. Compost must be supplied from a source listed on the Qualified Product List .

1. **Preparation of Earth Bed.** Seven to ten days prior to preparing earth bed all existing vegetation, including areas previously mulched or rye seeded for temporary erosion control, shall be sprayed and killed with Glyphosate (non-selective herbicide). The earth bed upon which the topsoil and/or compost is to be placed shall be at the required grade and properly trimmed. Just prior to placing topsoil and/or compost all earth beds, including areas previously mulched or rye seeded for temporary erosion control, shall be harrowed into a friable condition with a disk, a spring tooth drag or a spike tooth drag to a minimum depth of 3 inches. The harrowing shall be done so that all soil impressions left by all equipment are horizontal across the face of the slope.

2. **Placing Topsoil.** All areas which are to be seeded or sodded shall be covered with topsoil and/or compost, except that where slopes are constructed of topsoil, muck or peat, topsoil surface will not be required.

   The topsoil and/or compost shall be spread on the prepared areas to a depth of not less than 3 inches. After spreading, any large clods and lumps shall be pulverized and all stones and rocks over 2 inches in diameter, roots, litter and all foreign matter shall be raked up and disposed of by the Contractor off site according to Subsections 205.03.A.3 and 205.03.P.

   All topsoil and/or compost that has been placed on conditioned earth bed shall be incorporated into the upper 2 inches of the earth bed. Topsoil and/or compost shall not be worked when in a wet condition.

3. **Surplus Excavated Topsoil or Salvaged Topsoil.** If there is a surplus of topsoil or salvaged topsoil it shall be stockpiled within the right of way as directed by the Engineer. If stockpiled, it shall have an aesthetically pleasing appearance.

B. **Chemical Fertilizer Nutrient.** Fertilizing consists of furnishing and placing fertilizer on the areas as required. In areas to be sodded, granular fertilizer shall be uniformly applied before sod is laid. The granular fertilizer selected for the seeding areas shall be uniformly applied on the prepared seed bed and shall be incorporated into the upper 1 to 2 inches of the topsoil and/or compost by light discing or harrowing. Granular fertilizer shall be well pulverized and free from lumps when applied.

Fertilizer to be applied by the hydro-method shall be constantly agitated while being applied and will not require discing and harrowing after being placed. Fertilizer mixed with seed shall be applied within one hour after seed and fertilizer have been added to the mixture.

1. **Class A.** Class A fertilizer shall be evenly applied on the prepared topsoil at a rate which will provide 228 pounds per acre of chemical fertilizer nutrient.
2. **Class B.** Class B fertilizer shall be evenly applied on the prepared topsoil at a rate which will provide120 pounds per acre of chemical fertilizer nutrient.
3. **Class C.** Class C fertilizer shall be evenly applied on established turf at a rate which will provide 80 pounds per acre of chemical fertilizer nutrient.

C. **Seeding.** Seeding consists of preparing the seed bed, furnishing and sowing the specified mixture of seed. Seed for each species shall be selected from the Qualified Products List. The work of seeding shall be done after topsoil has been placed as described in subsection 816.03.A and approved by the Engineer. Broadcast or hydroseeding operations shall not be performed during periods of windy conditions which would prevent the proper placing of the seed. Tables 816-1 and 816-2 give turf and specialty seed mixtures and rate of seeding.

1. **Permanent Seeding.**

   a. **Sowing.** The seed shall be sown following or in conjunction with the fertilizer while the seed bed is in a friable condition. Seed for each species shall be selected from the Qualified Products List. Just prior to seeding, the topsoil and/or compost shall be harrowed to a minimum depth of 3 inches into a friable condition with a disk, a spring tooth drag, a spike tooth drag, or by other equipment designed to prepare the soil for seeding and meeting the approval of the Engineer. The harrowing shall be done horizontally across the face of the slope to minimize erosion. Areas where seed mixture Turf Loamy to Heavy (THM) is specified, the seed bed shall be raked and Class A slopes will be required.

   Seed shall be sown before mulch is applied. The seed mixture required shall be sown, or resown, at the rate specified in Tables 816-1 and 816-2, with either mechanical drills or hydroseeders or by the broadcast method. Seeding in areas with 1: 4 slopes or flatter shall be sown with mechanical drills. For slopes steeper than 1:4 the hydroseeding method may be used. The seeding equipment shall provide uniform coverage over the area to be seeded as determined by the Engineer. The content of the hydroseeder tank shall be emptied within one hour after the seed and fertilizer is added to the tank. Seed which is allowed to remain mixed with the water for longer than one hour shall be rejected. The broadcast method may be used in areas to be resown or in areas that are unaccessible to a drill or hydroseeder.

   Areas which are sown by the broadcast or the hydroseed method will be visually inspected for uniformity of application. If inspection fails to reveal an average of two seeds per square inch, the area shall be resown by the Contractor at no additional cost to the Department.

Table 816-1 General Roadside Seed Mix Selection Guide

Symbol for Turf Seed Mixture	Soil Type	General Location	Rate of Seeding	Tolerance to Salt
TDS (Turf Dry Sandy)	Dry Sandy to Sand Loam	Rural or Urban	220 #/Acre	Low to Medium
THV (Turf Heavy Soil)	Heavy	Rural	220 #/Acre	Medium to High
TUF (Turf Urban Freeway)	All Types	Urban Freeways, Blvds., Service Roads, City Streets	220 #/Acre	Low to High
TGM (Turf Medium to Heavy Soil)	Medium to Heavy	All	220 #/Acre	Low
THM (Turf Loamy to Heavy)	Loamy to Heavy	Residential and Business Turf	220 #/Acre	Low to Medium

Table 816-2 Specialty Seed Mix Selection Guide

Symbol for Seed Mixture	Soil Type	General Location	Rates of Seeding	Tolerance to Salt
Mixture for Upland Areas				
ES (Environmental Seeding)	All	Upland Areas	110 #/acre	N/A
Temporary Seeding Mixtures				
CR (Cereal Rye, less than 6 mos.)	All	All	70 #/acre	N/A
TSM 6/24 (Temporary Seeding, 6 - 24 mos.)	All	All	100 #/acre	N/A
TSM 24+ (Temporary Seeding, 24+ mos.)	All	All	200 #/acre	N/A

b. **Setting the Seed.** Areas sown by the hydroseed or the broadcast method shall be lightly compacted or lightly raked to incorporate the seed into the uppermost ½ inch of the topsoil surface. Immediately after setting the seed, the seeded areas shall be mulched as provided in subsections 816.03.E and 816.03.F.

2. **Temporary Seeding.** Temporary seeding shall only be done with the approval of the Engineer. Temporary seeding shall be done as described in subsection 816.03.C.1 except for the following additions or changes. Temporary seeding will only be placed for erosion control or temporary soil stabilization. Prior to contract completion, temporary seeding shall be replaced by permanent seeding as called for on the plans or as directed by the Engineer. Slopes 1:3 or steeper that have been topsoiled shall not be temporarily seeded but shall be permanently seeded.

3. **Dormant Seeding.** Dormant seeding will only be permitted for limited areas to complete a project and shall be constructed according to the requirements for permanent seeding. Dormant seeding must be approved by the Engineer.

4. **Seasonal Limitations.**

   a. **Permanent Seeding.** Seeding shall be done only during the following seasonal periods.

      Southern Lower Peninsula. South of the north boundary of Township 20 North, April 15 through October 10.

      Northern Lower Peninsula. North of the north boundary of Township 20 North, May 1 through October 1.

      Upper Peninsula. May 1 through September 20.

   b. **Dormant Seeding.** Dormant seeding shall only be done during the following periods.

      Southern Lower Peninsula. South of the north boundary of Township 20 North, after November 15 but not on frozen ground.

      Upper Peninsula and Northern Lower Peninsula. North of the north boundary of Township 20 North, after November 1, but not on frozen ground.

   c. **Temporary Seeding.** Seasonal limitations shall be the same as for permanent seeding and dormant seeding.

5. **Inspection.** The Engineer will inspect the seeded turf to ensure that the end product is well established, weed free, in a growing and vigorous condition, and contains the species called for in the seeding mixture.

   If weed control is required by the Engineer, the work shall be completed as specified in subsection 816.03.J and shall be paid for as weed control except if hay mulch is used, no payment will be made for weed control.

D. **Sodding.** Sodding consists of preparing the topsoil surface, furnishing and placing the sod, and disposing of any surplus material. Areas to be sodded shall be graded to Class A slopes as specified in subsection 205.03.N.

Just prior to laying sod, the topsoil shall be harrowed to a minimum depth of 3 inches with a disk, spring tooth drag, spike tooth drag or other equipment designed to condition the soil. The harrowing equipment shall meet the approval of the Engineer. The harrowing shall be done horizontally across the face of the slope.

The Contractor shall thoroughly water the earth bed prior to laying the sod and water the sod immediately after it is laid according to subsection 816.03.I. Sod that has been allowed to dry out at any time will be rejected. Sod shall be laid within 24 hours after cutting and shall be properly protected until placed. Pitch forks shall not be used to handle sod, and dumping from vehicles will not be permitted. Frozen sod shall not be placed, nor shall any sod be placed on frozen soil. Sod shall not be placed in the dry months of June, July or August unless approved by the Engineer.

Sod shall be carefully placed according to the pattern and detail shown on the Standard Plan R-100 Series. The short ends of the sod strips shall be staggered and laid parallel to the flow of water on slopes and in ditches. Sod should be laid commencing at the base of the slope and working upward. Edges of sodded areas shall be turned into the ground and

covered with a layer of earth or shoulder material. This material shall be thoroughly compacted so as to allow the surface water to flow over the edge of the sod. The sod shall be carefully laid to produce tight joints. Next to paved surfaces sod shall butt without a gap. The surfaces of the sod and hard surface or top of curb shall be at the same elevation.

When the sod may be displaced during sodding operations, workers shall work from ladders or treaded planks. Sod shall be firmly compacted by tamping immediately after it is placed. After tamping, the sod shall present a smooth, even surface free from bumps and depressions. Where Class A Slopes are specified, the finished surface shall present a lawn-like appearance. On slopes steeper than 1:3, the sod shall be pegged with wooden pegs. The pegs shall be spaced not over 2 feet apart in any direction and shall be driven flush with the surface of the sod.

E. **Mulching.** Mulching consists of furnishing, spreading and anchoring mulch materials. The mulch shall be placed on a given area within one day after the seeding has been placed.

Mulching operations shall not be performed during periods of excessively high winds which would prevent the proper placing of the mulch and anchoring mulch.

The in place mulch shall be loose or open enough to allow some sunlight to penetrate and air to circulate, but thick enough to shade the ground, conserve soil moisture, and prevent or reduce water or wind erosion.

The Contractor shall maintain the mulched areas and shall repair all areas damaged by erosion, traffic, fire or other causes prior to final or partial acceptance of work under the contract. Mulch which has become displaced shall be replaced at the Contractor's expense, except as provided in subsection 107.11 or in section 208.

Mulch shall be spread over the surface to a uniform thickness at the rate of 2 tons per acre unless otherwise specified on the plans, except that for areas where dormant seeding has been permitted, the mulch shall be placed at the rate of 3 tons per acre. When hay is permitted according to subsection 917.13A, the rate of application shall be 1.5 times the rate of straw.

When hay is permitted, herbicide application(s) shall be required as specified in subsection 816.03.J. Herbicide applications shall be made at the Contractor’s expense.

F. **Mulch Anchoring.** Mulch anchoring materials (tackifier) shall be selected from the Qualified Products List. Anchoring mulch shall be applied by spraying immediately after mulch has been placed. Spraying shall not be performed during periods of windy conditions which would prevent the proper placement of adhesive. The Contractor shall protect all traffic, signs, structures, and other objects from being marked or disfigured by the tackifier material. Overspray will be immediately removed by the Contractor. The tackifiers shall be applied at the following minimum rates per acre:

1. **Latex-Base.** Mix 15 gallons of adhesive, or the manufacturers recommended rate, which ever is greater, with a minimum of 250 pounds of recycled newsprint and 375 gallons of water.
2. **Recycled Newsprint.** Mix 750 pounds of recycled newsprint with 1500 gallons of water.
3. **Wood Fiber.** Mix 750 pounds of wood fiber with 1500 gallons of water.

4. **Guar gum.** Mix 50 pounds of dry adhesive and a minimum of 250 pounds of recycled newsprint as a tracer with 1300 gallons of water.

5. **Other Tackifiers.** Mix 100 pounds of dry adhesive, or the manufacturer's recommended rate, which ever is greater, and a minimum of 250 pounds of recycled newsprint as a tracer with 1300 gallons of water.

G. **Mulch Netting.** Netting shall be placed over mulch and shall be secured with net anchors staples or pins.

The net shall be spread over the mulch so that there is room for a worker to walk between adjacent widths of the net. The edges of the adjacent width of net shall be pulled together and held in place by net anchors. Net anchors shall be spaced not more than 2.5 feet apart along the edges, joints, and centerline of the net according to the manufacturer's recommendation. Some of the mulch must be under the anchors so that the net is not in direct contact with the ground. The ends of each width of net shall be butted together and held in place by net anchors at each corner and at the center of the net.

No traffic will be permitted over the net after it is placed, except to repair it. Any torn or damaged net shall be replaced with undamaged material.

H. **Mulch Blankets.** This work consists of furnishing, installing and anchoring blankets. Mulch blankets shall be selected from the Qualified Product List. The mulch blankets shall be placed on a given area within one day after the seeding has been placed. Blankets shall be butted directly against each other, except in waterways. In waterways, blankets shall be placed in the direction of the flow of water with an overlap of 12 inches on the downslope edge. On backslopes the blankets shall be placed at right angles to the roadbed. On foreslopes the first strip adjacent to the road shall be laid parallel to the road with the remainder of the strips placed either parallel or at right angles to the road. When blankets are installed from the top of the slope they should not be allowed to free fall down the slope.

Net anchors shall be placed at minimum intervals of 2.5 feet along all joints, edges, and the centerline of the blanket. The net anchors (pins or staples) for anchoring the blanket shall meet subsection 917.13.D.2.

The manufacturer's directions shall be followed in placing and anchoring blankets if those requirements are greater than these minimum requirements.

1. **High Velocity Blankets.** High velocity blankets shall be used on slopes 1:2 or steeper and on ditch bottoms (12 inches up the slope). High velocity blankets may be substituted for mulch blankets at no increase of cost.

2. **Mulch Blankets.** Mulch blankets shall be used on slopes flatter than 1:2, adjacent to shoulders and behind curbs. These mulch blankets with netting on one side shall be placed with the netting on top and mulch fibers in contact with the soil. These blankets shall only be used on ditch bottoms with slopes up to 1.5 percent unless otherwise specified on the plans.

I. **Water.** This work consists of furnishing and applying water. A minimum of 35 gallons of water will be required to establish each square yard of sod. Earth bed shall be thoroughly watered prior to laying the sod with a minimum of 3.5 gallons per square yard; Within eight hours after the sod has been placed, 9 gallons of water per square yard shall be applied by the spray method; five additional applications shall be made at three to four day intervals

at the rate of 3.5 gallons per square yard per watering. Additional applications may be required by the Engineer based on the season and weather conditions. Seeded areas shall be watered at the rate of 3.5 gallons per square yard when required. Watering shall continue regularly so that seed/seedlings do not dry out once watering has begun.

J. **Weed Control.** Weed control is to be used when directed, to eliminate the undesirable broadleaf weeds within the newly seeded turf. Target weeds shall be sprayed when the new turfgrass has become sufficiently established to withstand a herbicide application. All herbicide applications shall be made by a Licensed Commercial Applicator licensed in the State of Michigan and all individuals applying pesticides shall posses a valid Michigan Department of Agriculture commercial pesticide applicator's certificate for the appropriate category. All application procedures and materials shall meet all federal, state and local regulations.

The Contractor shall furnish and apply herbicide(s) when directed. It shall be the Contractor's responsibility to select the herbicide(s) and the rate at which it will be used. The work and herbicide(s) shall be approved by the Engineer prior to the application of the material.

Prior to spraying, the spraying equipment shall be inspected and approved by the Engineer. The Contractor shall be required to demonstrate that the equipment and operators are capable of applying an even and controlled application within the specified target area. All equipment shall meet all federal, state and local safety requirements.

Target weeds shall have been controlled within fourteen days after spraying. The Contractor shall be responsible for additional weed control applications if the first application was not successful at no additional cost to the Department.

All property adjacent to the roadway shall be preserved and protected from injury by the Contractor. Any damages arising from any act or omission in the performance of the work shall be repaired at the Contractor's expense.

816.04 Measurement and Payment.

Contract Item (Pay Item)	Pay Unit
Compost Surface, Furn, LM	Cubic Yard
Compost Surface, Furn, __ inch	Square Yard
Topsoil Surface, Salv, LM	Cubic Yard
Topsoil Surface, Salv, __ inch	Square Yard
Topsoil Surface, Furn, LM	Cubic Yard
Topsoil Surface, Furn, __ inch	Square Yard
Fertilizer, Chemical Nutrient, Cl __	Pound
Seeding, Mixture __	Pound
Sodding	Square Yard
Mulch	Square Yard
Mulch Anchoring	Square Yard
Mulch Netting	Square Yard
Mulch Blanket	Square Yard
Mulch Blanket, High Velocity	Square Yard
Water, Sodding/Seeding	Unit
Weed Control	Acre

A. **Compost**.

1. **Compost Surface, Furn LM** will be measured loose and trucked onto the jobsite.
2. **Compost Surface, Furn** will be measured in place and trucked onto the jobsite.

B. **Topsoil. Topsoil Surface, Salv, LM** will be measured loose measure.

Topsoil Surface, Salv will be measured in place.

Topsoil Surface, Furn, LM will be measured loose measure and trucked onto the jobsite.

Topsoil Surface, Furn will be measured in place and trucked onto the jobsite.

C**. Fertilizer, Chemical Nutrient, Cl** __ will be measured by the pounds of chemical nutrient contained in the fertilizer applied. The following formula will be used to determine the weight of chemical fertilizer nutrient for payment: Total weight of fertilizer applied multiplied by the sum of percentages of nutrients contained in the fertilizer used equals the weight of chemical fertilizer nutrients.

D. **Sod. Sodding** will be measured in place.

E. **Mulching Materials.**

1. Payment for **Mulch** will include furnishing and spreading straw mulch or marsh hay mulch at the rate specified on the plans. There shall be no adjustment of compensation when hay is permitted. When dormant seeding is allowed, **Mulch** will be paid for at 1.5 times the contract unit price bid for mulch. For straw mulch, marsh hay mulch or hay mulch when permitted, the Contractor shall furnish the Engineer with tickets in triplicate at the time of delivery showing the number of bales in each load and weight of each load. The mulch shall be weighed on scales which meet subsections 104.01E and 109.01.G.
2. **Mulch Blanket High Velocity** shall be either high velocity excelsior mulch blankets or high velocity straw mulch blankets and will be measured in place. Payment will include furnishing, placing, and anchoring the blankets.
3. **Mulch Blanket** shall be either excelsior mulch blankets, straw mulch blankets, high velocity excelsior mulch blanket or a high velocity straw mulch blanket and will be measured in place. Payment will include furnishing, placing, and anchoring the blankets. **Mulch Blanket, High Velocity** that is substituted for **Mulch Blanket** will be paid for at the unit price bid for **Mulch Blanket.**
4. **Mulch Anchoring** will be measured in place. Payment for **Mulch Anchoring** will include furnishing and spraying the tackifier at the required rate over the mulched area. Any mulch that has blown away or displaced for any reason that is attributable to the Contractor's failure to take proper precautions shall be replaced and anchored as directed by the Engineer at the Contractor's expense.
5. **Mulch Netting** will be measured in place. Payment for **Mulch Netting** shall include furnishing, placing, and anchoring netting. When the Contractor elects to use the dormant seeding method the mulch netting will be required in addition to the mulch adhesive. Any additional costs incurred by the Contractor in electing to place dormant seeding will be at the Contractor's expense.

F. **Water, Sodding/Seeding.** Water will be measured in 1000 gallon units

G. **Weed Control** will be measured in place.